

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION See paragraph 2 below

International application No.
PCT/JP2005/008453

International filing date (day/month/year)
27.04.2005

Priority date (day/month/year)
28.04.2004

International Patent Classification (IPC) or both national classification and IPC
G02F1/13363, G02F1/139, G02F1/1335

Applicant

CANON KABUSHIKI KAISHA

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office - P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl
Fax: +31 70 340 - 3016

Authorized Officer

Stang, I

Telephone No. +31 70 340-3493



WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITYInternational application No.
PCT/JP2005/008453**10/553035****Box No. I Basis of the opinion**

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 a sequence listing
 table(s) related to the sequence listing
 - b. format of material:
 in written format
 in computer readable form
 - c. time of filing/furnishing:
 contained in the international application as filed.
 filed together with the international application in computer readable form.
 furnished subsequently to this Authority for the purposes of search.
3. In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
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International application No.
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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or
industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N) Yes: Claims 5-15
 No: Claims 1-4

Inventive step (IS) Yes: Claims 5-12,14,15
 No: Claims 1-4,13

Industrial applicability (IA) Yes: Claims 1-15
 No: Claims

2. Citations and explanations

see separate sheet

Re Item V.

1 Reference is made to the following document:

D1 : US 5 753 937 A (SHIMOMAKI ET AL) 19 May 1998 (1998-05-19)

D2: ASSOULINE G ET AL: "liquid-crystal display with electrically controlled birefringence" ELECTRONICS LETTERS UK, vol. 8, no. 2, 27 January 1972 (1972-01-27), pages 45-46, XP002335593 ISSN: 0013-5194

2 INDEPENDENT CLAIM 1

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

Document D1 discloses (the references in parentheses applying to this document):

A liquid crystal display apparatus (column 14, lines 20,21, figure 6), comprising:
at least one polarization plate (30,31), a phase difference plate (50),
a pair of oppositely disposed substrates at least one of which is a transparent substrate (11,12),

a liquid crystal (LC) disposed between said pair of substrates, and
means for applying a voltage to said liquid crystal so that a retardation of said liquid crystal is modulated depending on the voltage applied to said liquid crystal (column 4, lines 39-48; figure 9),

wherein said liquid crystal is placed in a first alignment state which is determined by said pair substrates when the voltage is not applied thereto (column 14, line 47 to column 15, line 8),

wherein said phase difference plate has a retardation so that light passing through said liquid crystal, said phase difference plate, and said polarization plate assumes chromatic colour when the voltage is not applied to said liquid crystal (column 16, line 41-44; figure 9, see remark 1 below), and

wherein said liquid crystal is placed in a second alignment state in which said liquid crystal is aligned obliquely compared with the first alignment state (column 4, lines 39-48) so that the retardation of said liquid crystal cancels the retardation of said phase difference plate when the voltage is applied to said liquid crystal (figures 7,8, see remark 2).

Remarks:

- 1) Comparing the embodiments 1 and 2 of D1 it follows that the addition of a phase difference plate causes a change of the zero voltage colour from green to red.
- 2) According to figure 8 achromatic (white) light is passing the nearly parallel polarization plates (30,31; see figure 7) at large voltages. This means that nearly linear polarized light results from the combination of the liquid crystal birefringence and the phase difference plate retardation indicating that the phase difference plate compensates the liquid crystal retardation for a wide range of applied voltages.

3 DEPENDENT CLAIM 2-4

Dependent claim 2 does not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Article 33(2) PCT):

Claim 2: According to figure 9 of D1 a voltage range providing chromatic colours extends from 0V to about 2.5V whereas above 2.5V achromatic brightness modulation takes place.

Claims 3, 4: In embodiment 1 of D1 the liquid crystal cell shows white at the predetermined voltage whereas at maximum voltage the cells turns to black. This is mainly caused by the use of nearly crossed polarization plates. One or two phase difference plates may be added.

4 DEPENDENT CLAIM 13

The problem to be solved by claim 13 may be regarded as the strong temperature dependence of devices showing birefringent colours.

D2 describes this problem but also shows that for certain voltage ranges colours are less susceptible to temperature changes than in other voltage ranges (at higher voltages), i.e. the change ratio of the retardation to a temperature can be chosen to be substantially in certain voltage ranges (figure 2). The skilled person would regard it as a normal design procedure to apply this knowledge to multi-colour displays and to optimize accordingly electrically controlled birefringence cells as e.g. those of D1 by a routine process. Therefore claim 13 does not meet the criteria of Article 33(1) PCT, because the subject-matter of this claim does not involve an inventive step in the

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AUTHORITY (SEPARATE SHEET)**

International application No.

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sense of Article 33(3) PCT.

5 DEPENDENT CLAIMS 5-12,14,15

The combination of the features of dependent claims 5-12,14,15 are neither known from, nor rendered obvious by, the available prior art.